## CLEAN VERSION OF THE ABSTRACT

Please enter in the pending application the clean version of the following Abstract:

### ABSTRACT

The invention is a method of measuring transfer functions of a physical system using a wideband excitation signal by exciting the system with a low-power, wide band input signal that has a rich frequency content over a wide band and using a stochastic process to derive a system transfer function over the excitation signal bandwidth.

## VERSION WITH MARKINGS TO SHOW CHANGES MADE

The following is a marked-up version of the Abstract:

### ABSTRACT

The invention is a method of measuring transfer functions of a physical system using a wideband excitation signal [comprising the steps of] by exciting the system with a low-power, wide band input signal that has a rich frequency content over a wide band and using a stochastic process to derive a system transfer function over the excitation signal bandwidth.

## CLEAN VERSION OF THE CLAIMS 77-105 AND 108-123

Please enter in the pending application the clean version of the following claims:

77. A method of acquisition and signal transmission through a plurality of spatially distributed locations comprising the steps of:

a) exciting at a low power a physical system with a wide band excitation signal as an input signal;

b) locating a data recorder/processor at spatially distributed locations;

c) interconnecting each said spatially distributed data recorder/processor to an acquisition control computer using a telemetry network;

d) sending a frequency synchronization signal through said telemetry network;

e) simultaneously receiving and recording said wide band excitation input signal in said data recorders/processors at each spatially distributed location;

f) sending said recorded wide band excitation input signals to said acquisition control computer via said telemetry network; and,

g) using a stochastic process to derive from said recorded wide band excitation input signals a system transfer function for said physical system over the width of said wide band excitation signal.

79. The method of Claim 78 wherein two data recorders/processors are used.

80. The method of Claim 78 wherein three or more data recorders/processors are used.

17 12 ~~93~~. The method of Claim ~~89~~ 13 wherein said frequency synchronization signal is not integrated with the wide band excitation input signal so that two separate signals are transmitted through the said telemetry network.

19 ~~95~~. The method of Claim ~~77~~ 1 wherein said spatially distributed data recorders/processors down-convert the received wide band excitation input signals.

23 ~~99~~. The method of Claim ~~98~~ 22 wherein said one or more waveform synthesizers synthesizes a modulated signal about a specified center frequency.

29 ~~105~~. The method of Claim ~~98~~ 28 wherein said one or more waveform synthesizer uses up-conversion to shift the modulated signal and specified center frequency to a new frequency about a new specified center frequency.

32 ~~108~~. The method of Claim ~~106~~ 30 wherein said wide band excitation input signals consist of ambient radiation.

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~~109.~~ Apparatus for obtaining data for measuring the transfer function of a physical system comprising:

a) a waveform synthesizer for generating a synthesized low-power, wide band waveform signal and exciting said physical system with said synthesized low-power, wide band waveform signal as an input signal;

b) a first data recorder/processor for sampling said synthesized low-power, wide band waveform signal;

c) second and third data recorders/processors located at spatially distributed locations within said physical system;

d) digital fiber optic telemetry for digitally interconnecting each of said first, second and third data recorders/processors and said waveform synthesizer;

e) an acquisition control computer connected to said first, second and third data recorders/processors and said waveform synthesizer in a network arrangement;

f) a synchronization signal generator connected to said network arrangement; and,

g) controller means for simultaneously commanding said waveform synthesizer to broadcast said synthesized low-power, wide band waveform signal to excite the physical system and to send a synchronization signal through said network arrangement to cause said first data



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recorder/processor to sample said synthesized low-power, wide band waveform signal, to cause said second and third data recorders/processors to measure and record the signals received in said physical system from said low-power, wide band input signal, and to cause said first, second and third recorders/processors to convert said measured and recorded signals received therein to digital format and to send said digital format in synchronized form through said network arrangement to said acquisition control computer for later processing in said acquisition control computer to compute a transfer function.

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35 ~~112~~. The apparatus of Claim ~~110~~ wherein said waveform synthesizer is adapted to up-convert the modulated excitation signal to a modulated excitation signal about a specified center frequency.

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36 ~~114~~. The apparatus of Claim ~~112~~ wherein said data recorders/processors use a two-step, down-conversion technique for shifting said excitation signal to a 15 MHz center frequency.

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~~115~~. The apparatus of Claim ~~112~~ wherein said data recorders/processors use a 12-bit analog-to-digital converter sampled at 12 MHz to digitize and store said excitation signal.

93 ~~119~~ The apparatus of Claim ~~109~~ 33 wherein said synchronization signal is integrated with said signal received in said physical system from said synthesized low-power, wide band waveform signal using pulse width modulation.

94 ~~120~~. A method of excitation, acquisition and signal transmission through a plurality of spatially distributed locations comprising the steps of:

a) exciting at a low power a physical system with a wide band excitation signal as an input signal;

b) locating a data recorder/processor at spatially distributed locations;

c) interconnecting each said spatially distributed data recorder/processor to an acquisition control computer using a telemetry network;

d) sending a frequency synchronization signal through said telemetry network;

e) simultaneously receiving and recording said wide band excitation input signal in said data recorder/processor at each spatially distributed location

f) sending said recorded wide band excitation input signals to said acquisition control computer via said telemetry network; and,